



Eurotherm Controls Inc.

TU/TC Series
Intelligent SCR Assemblies
with
Profibus DP Communications

to

S-S Technologies Inc.

5136-PFB-ISA
Direct-Link™
Profibus Interface Card

and the

PFBDDEM1 DDE Server

to

Wonderware's InTouch

Prepared By:

Eurotherm Controls Inc
(703) 471-4870
www.eurotherm.com

January 1999

HA136387

Issue 1.2

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CONTACT INFORMATION

Company	Address	Numbers/Web
Eurotherm Controls Inc.	11485 Sunset Hills Road Reston, Virginia 20190	Tel: (703) 471-4870 Fax: (703) 787-3436 www.eurotherm.com
S-S Technologies (SST)	50 Northland Road Waterloo, Ontario N2V 1N3 Canada	Tel: (519) 725.5136 Fax: (519) 725.1515 www.sstech.on.ca
Profibus User Group	PTO-USA Branch Office 16101 N. 82 nd Street Suite 3b Scottsdale, Arizona 85260	Tel: (602) 483-2456 Fax: (602) 482-7202 www.profibus.com
Wonderware Corporation	Corporate Headquarters 100 Technology Drive Irvine, California 92618	Tel: (949) 727-3200 Fax: (949) 727-3270 www.wonderware.com

Introduction

This application note describes a series of steps to configure the Eurotherm TU and TC Series thyristor (or Silicon Controlled Rectifier - SCR) assemblies with Profibus DP communications *as* Slaves to the S-S Technologies (SST) 5136-PFB-ISA Direct-Link interface card as a Master in a host PC. The TC3001 and TU 1471 are shown in Figure 1. Subsequently are steps on the configuration of the PFBDDM1 DDE Server to the 5136-PFB-ISA and to Wonderware's InTouch.

Figure 1. TU/TC Series



The TU Series consists of the 1170/71, 1270/71, 1450/51, 1470/71 and 2170. The 1170 range offers single load capability, the 1270 range offers dual independent load capability, and the 1450 range offers quad independent load capability – all are capable of driving into simple or complex loads. This capability is provided by the multi-mode firing of the units SCR's which may be single cycle, fast cycle, phase angle, or phase angle start then fast cycle. The TU 2170 range is designed for 3-phase resistive loads. All TU Series are capable of V-squared or VxI power control.

The CCC (control and comms board) option must be included when ordering the TU Series for Profibus DP communications.

In the TC Series only the TC3001 is currently available with Profibus DP communications. The TC3001 is a 3-phase SCR assembly designed to provide precision control and firing of virtually any type of load whether it is resistive, inductive, capacitive, 3-wire wye or delta, 4-wire wye, or 6-wire delta.

Hardware/Software Used

The following hardware and software shown in Tables 1 & 2 were used in the generation of this application note.

Table 1. Hardware Used

Hardware	Description	Supplier
TU1471	Quad SCR Assembly with Profibus DP communications.	Eurotherm Controls
5136-PFB-ISA	ISA Interface Card for Profibus DP, FDL, FMS, and MPI interfaces. Card is $\frac{3}{4}$ length 16 bit ISA bus compatible.	SST
PC	Any PC capable of running the Microsoft Windows 32 bit operating systems – NT V4.0 (with SP3) or greater is recommended.	N/A

Table 2. Software Used

Software	Description	Supplier
GSD File Editor	Software tool to generate Eurotherm instrument GSD files. Version 1.10 used.	Eurotherm Controls
PFBWin32	Profibus Configuration software used to generate and download interface module binary file(s). Version 1.08 used.	SST
PFBDDDEM1	Master DDE server for the 5136-PFB-ISA card. Version 1.10 used.	SST
InTouch	Windows visualization configuration and run-time software. Version 7.0 (FS2000) used.	Wonderware Corporation
Windows NT	Operating system for PC. Version 4 with SP3 used.	Microsoft

Step-By-Step

The following steps detail the configuration of the hardware and software listed in Tables 1 & 2.

1) Install the PFBWin32 software.

A copy of the SST Profibus Configuration software comes with every 5136-PFB-ISA interface card or is available for download from the SST web-site. It is a ZIP file that requires extraction to a temporary subdirectory. The filename is PFBWIN32.ZIP. Unzip and run setup to install. SST recommends using the default directories.

The SST Profibus Configuration software is a 32-bit application and runs satisfactorily on the Microsoft Windows 95 or Windows 98 operating system. However, we recommend installing it on a host computer running Microsoft Windows NT, version 4, with SP3 or higher.

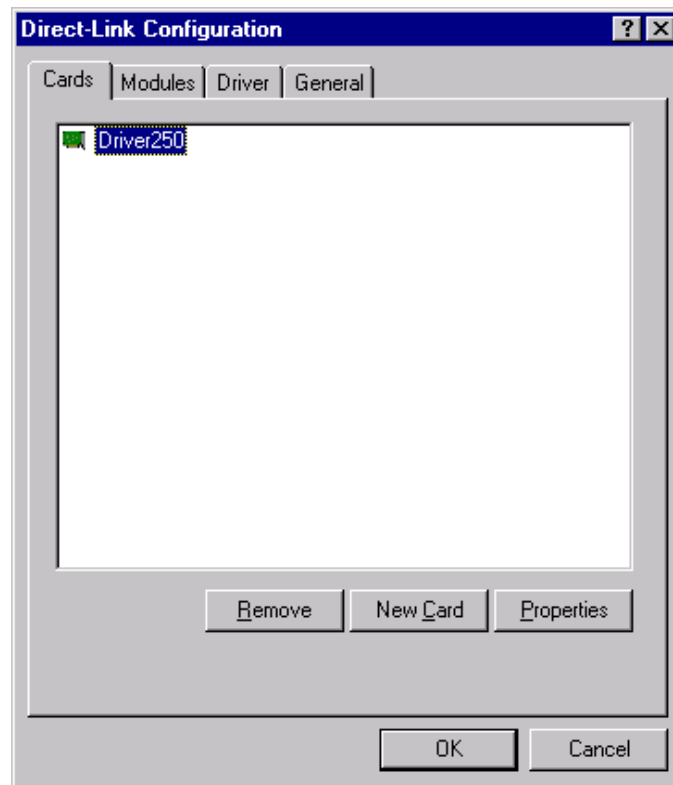
2) Install 5136-PFB-ISA Direct-Link Profibus interface card – hereafter referred to as interface card, into the host computer or PC.

The interface card is a $\frac{3}{4}$ length 16-bit ISA bus card. Be sure that the installer uses appropriate anti-static precautions before handling the card for installation into the host computer. Never touch the backplane connectors or pins.

Installation of the interface card requires computer resources in the form of I/O port address space (8 bytes), 16Kb shared memory segment, and optionally a host interrupt value. The default I/O base memory address of the interface card is 250, the default memory segment base address is 0xD000, and the ICR (interrupt) register has a value of 'none' which disables interrupts. For this application note, the Transmit (JP5) and Flash Write (JP6) enable jumper were left in the default position – or enabled (jumped). Since only 1 interface card was used the Shared Interrupt (JP3) was left at default – disabled (open). These settings should work in the majority of installations.

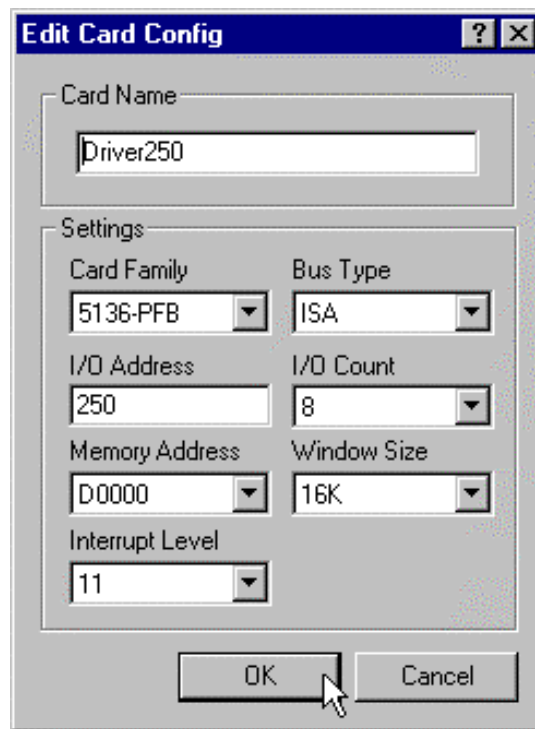
For installations requiring these settings to be modified, jumpers on the interface card set the I/O base address while the 16KB memory window and interrupt setting require the use of the Direct-Link Configuration program – see Figure 2. This program may be located in the Configuration Tools folder as *Direct-Link Configuration*.

The Direct-Link Configuration program enables interface card properties to be edited, new interface cards to be added – for example in a multiple card installation, or existing interface cards to be deleted. Selecting the Properties command button for the card of interest brings up the Edit Card Config dialog box shown in Figure 3 that is used to configure the resource settings the interface card requires.

Figure 2. Direct-Link Configuration

Note: To use the PFBDDDEMI Master DDE server as this application note does, an interrupt level must be set. Figure 3 shows an Interrupt of 11. Simply click on OK on both the Edit Card Config and Direct-Link Configuration dialog boxes to automatically set the card configuration.

The Card Name – shown as *Driver250*, is a reference to the interface card that is used in subsequent configuration. It cannot be changed once an interface card configuration has been created, saved, and downloaded to the interface card. Be sure that the I/O Address matches the jumpers on the interface card and ensure that the Memory Address segment start address and Interrupt Level do not conflict with other resources of the host computer.

Figure 3. Edit Card Config

The setting of these properties is further detailed in the 5136-PFB, 32-Bit Windows Development Guide, Version – 0.10, filename PFBWIN.DOC, April 1, 1997 available from SST.

3) *Wiring to Eurotherm TU/TC Series.*

As the speed of this connection may be as high as 12Mb/sec it is important to use appropriate cabling and termination. Table 3 lists the cable specifications. Table 4 lists the maximum cable length with respect to baud rate. Stub lines should be avoided for data speeds above 500kb/sec. A repeater is required when the number of stations (masters or slaves) in 1 segment exceeds 32.

Figure 4 shows the wiring diagram between the interface card and the TU Series. The interface card has 2 connectors for Profibus network connections – a standard DB9 female connector and a 5-pin Phoenix Combicon connector. These 2 connectors are internally connected.

The Phoenix connector is not shown wired to the TU Series in Figure 4 as the DB-9 is preferred. The TU Series terminals to which they would be connected if the Phoenix

connector is used is shown in Figure 4. As the Phoenix connector does not have a shield connection attach the cable shield to a convenient earth ground preferably at the PC end.

Though the Profibus specification recommends that the shield (braiding and if present shield foil using shield clamps) be connected at both ends, care must be taken to ensure that differences in local earth potential do not allow circulating currents to flow. If in doubt, connect the shield at one end only – preferably at the interface card, and that any cable segments have their shields connected.

It is important that the network cable be terminated at both ends. To use the internal terminations on the interface card when using the DB-9 or Phoenix connector, jumper 1 to 2 and 4 to 5 on the Phoenix connector.

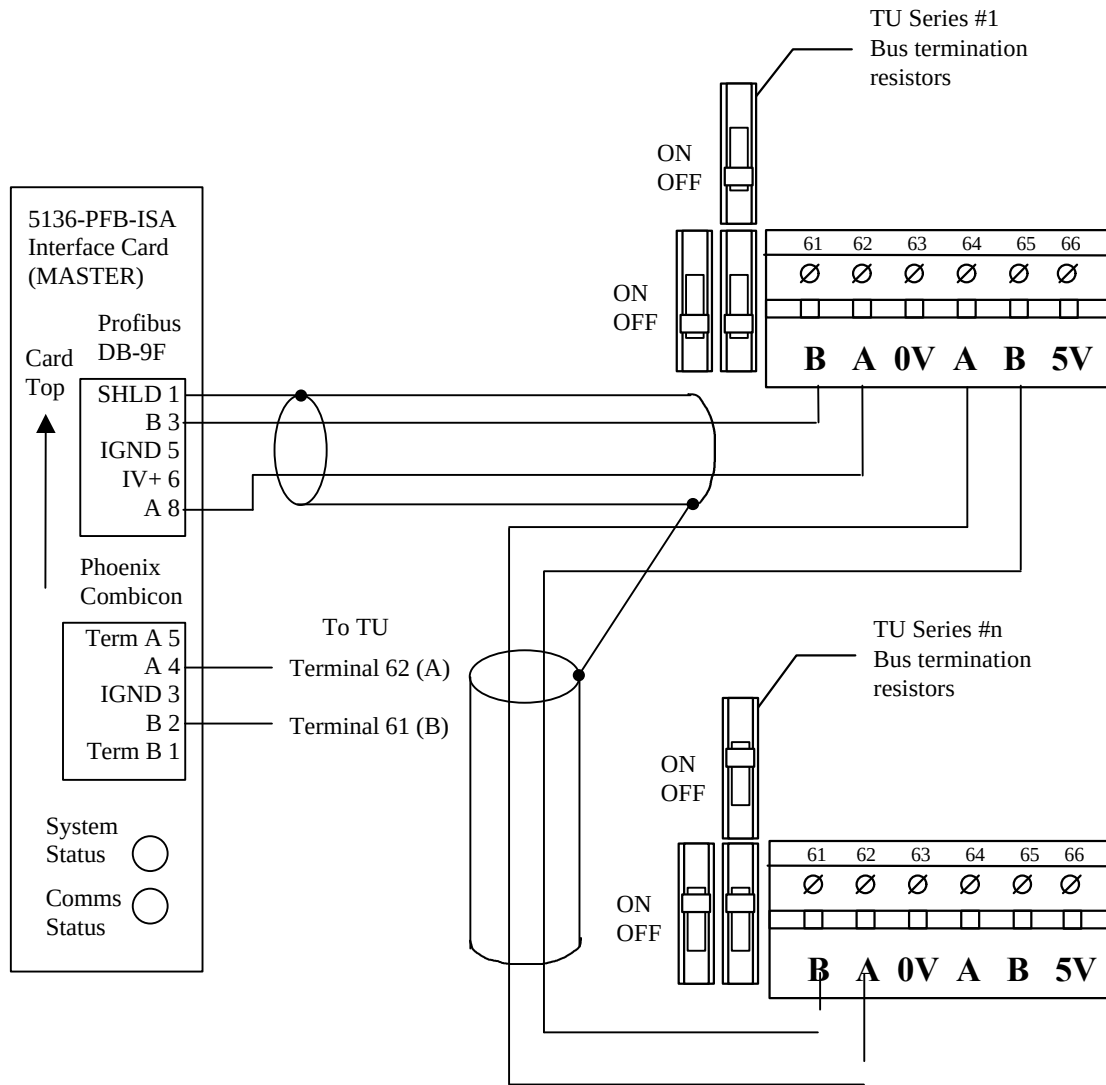
Table 3. Recommended Profibus Cabling

	Type A cable	Type B cable
Characteristic Impedance:	135 to 165 Ω at a frequency of 3 to 20 MHz.	135 to 165 Ω at a frequency of > 100 kHz
Cable capacitance:	< 30 pF per Meter	typical < 60 pF per Meter
Core diameter:	Max. 0.34 mm ² , corresponds to AWG 22	Max. 0.22 mm ² , corresponds to AWG 24
Cable type:	Twisted pair cable. 1x2 or 2x2 or 1x4 lines	Twisted pair cable. 1x2 or 2x2 or 1x4 lines
Resistance:	< 110 Ohm per km	-
Shielding:	Copper shielding braid or shielding braid and shielding foil	Copper shielding braid or shielding braid and shielding foil

Belden (belden.com) 3097A or 9182 is recommended, but other choices are available. For more information refer to the 'Profibus Product Guide' produced by the Profibus User Group – see www.profibus.com.

Table 4. Maximum Cable Length

Baud rate (kbit/sec)	9.6	19.2	93.75	187.5	500	1500	12000
Type A cable	1200m	1200m	1200m	1000m	400m	200m	100m
Type B cable	1200m	1200m	1200m	600m	200m	-	

Figure 4. TU Series Profibus Wiring Diagram

The bus termination resistors should be 'ON' for only the last TU/TC Series on the Profibus DP network.

As the TC Series has different connector numbers, Table 5 lists the TC Profibus DP communication terminals with respect to the TU Profibus DP communication terminals.

Table 5. TU/TC Profibus DP Communication Terminal Assignments

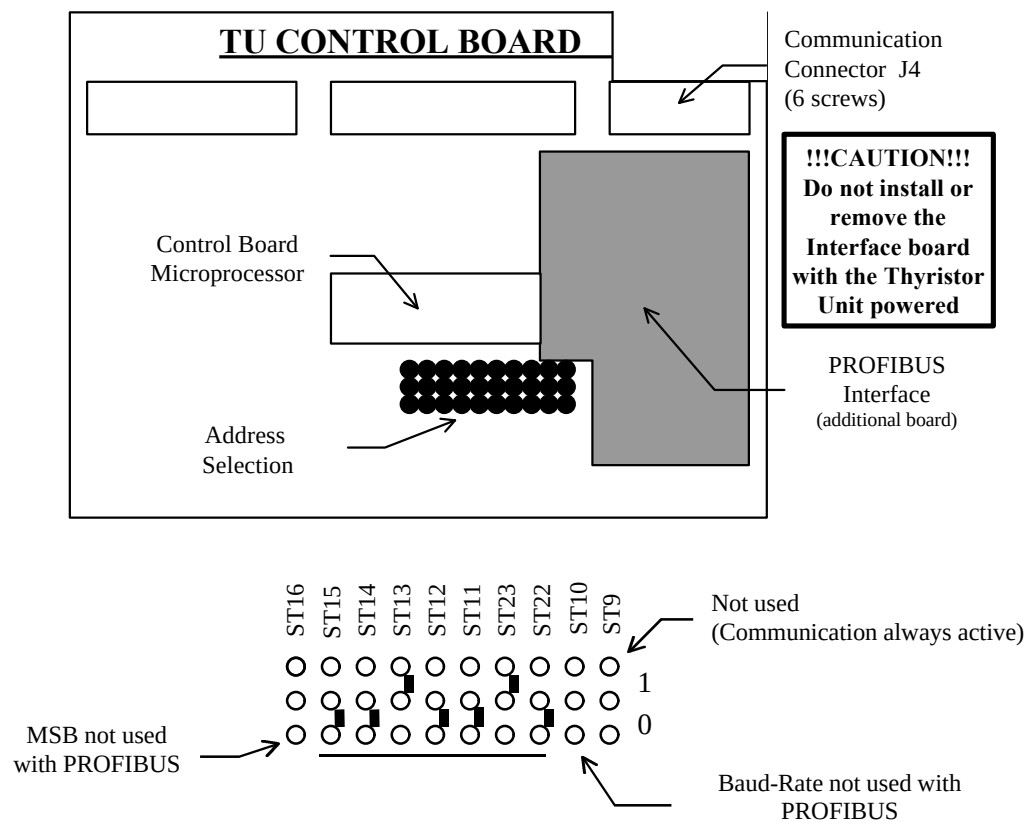
Interface Card		TU Series		TC Series	
<i>DB-9F</i>	<i>Function</i>	<i>J4 Connector</i>	<i>Function</i>	<i>J4 Connector</i>	<i>Function</i>
3	B	61	B	1	B
8	A	62	A	2	A
		63	0V	3	0V
		64	A	4	A
		65	B	5	B
		66	5V	6	5V

4) Configure TU/TC Series

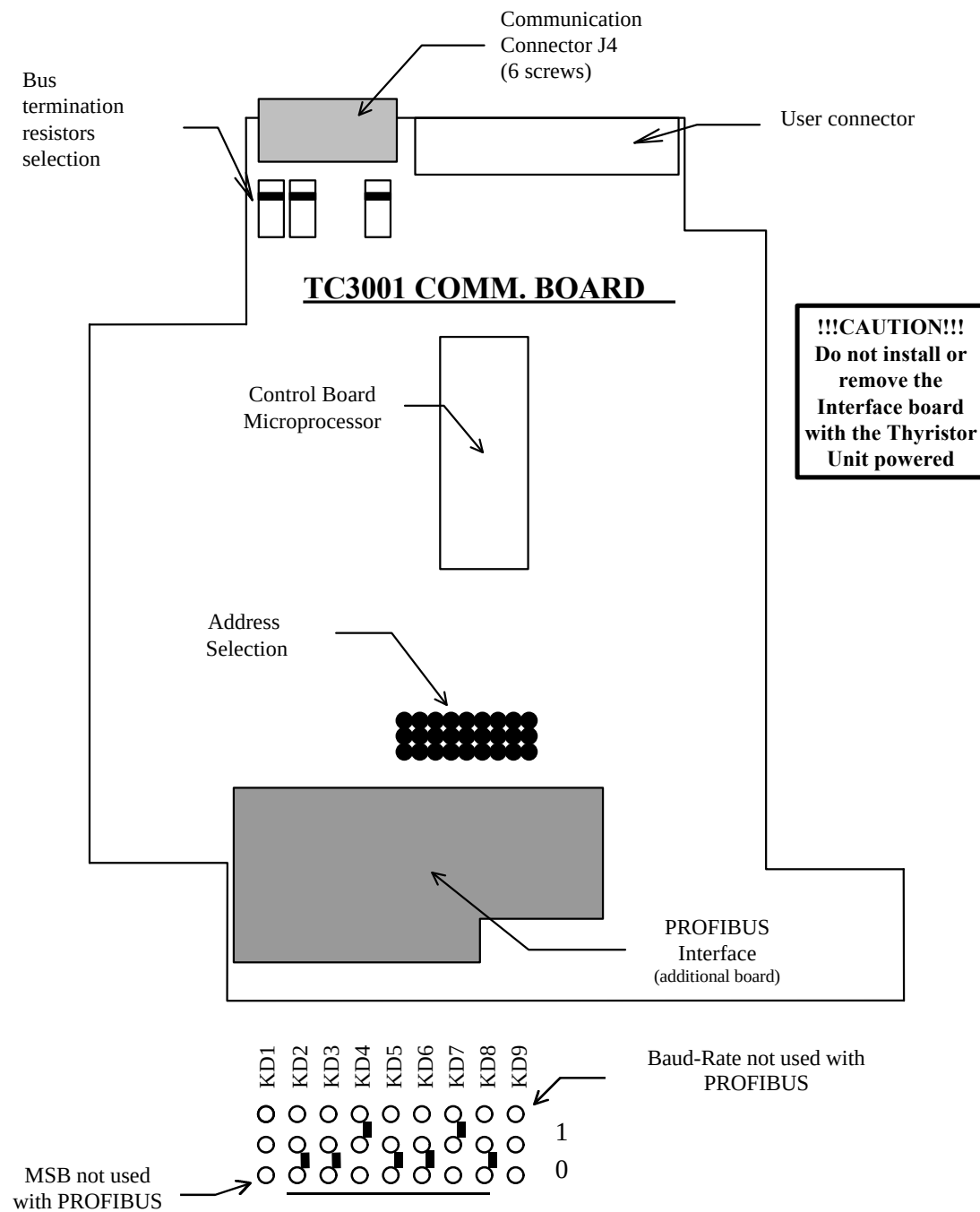
The only necessary jumper setting to establish communications is to set an unassigned comms address that is set to match those configured in the interface card. The baud rate is automatically set to match that configured in the interface module. There are data or stop bit settings. The baud rate does not require setting in the TU/TC series as it automatically sets itself to whatever the interface card is set to. Figure 5 shows the location of the address jumpers for the TU Series. Figure 6 shows the TC Series communication board and the location of the address jumpers.

In order to validate communications the auxiliary power supply must be connected. While it is not necessary to have a load(s) connected to the TU/TC Series to validate Profibus DP communications, having a load(s) connected enables familiarity of operation and 'real' values.

Figure 5. TU Series Control Board Address



Address 18 is shown in the example above.

Figure 6. TC Series Comm. Board Address

Again, address 18 is shown in the example above.

5) Create or Modify the GSD file.

GSD is an acronym of a German phrase meaning 'Device Database'. GSD files provide a clear and concise definition of the parameter characteristics of an automation device in a precisely defined file format.

Determine if the GSD files shipped with the Eurotherm GSD file editor meet the requirements for the intended application. One GSD for a TU and one GSD for a TC are shipped as part of the GSD file editor – see Table 6. The Eurotherm GSD file editor is available for free download at the Eurotherm web-site or the GSD files may be downloaded from the Profibus User Groups web-site under the GSD Library section.

If the standard GSD files do not meet the application requirements generate a suitable configuration using the GSD file editor. No manual editing of the GSD file is required. It is then recommended – though not required, that the saved GSD file be copied to the GSD subdirectory in the SST Profibus Configurator tools. This is normally located in the subdirectory Dlink32/5136-pfb/Common/Pbc/Gsd – if the standard file locations are used. This causes the automatic importing of GSD files into the Slaves hierarchical tree view.

Some notes about the TU/TC Series Profibus DP implementation with regards to the GSD file in the Parameterization section:

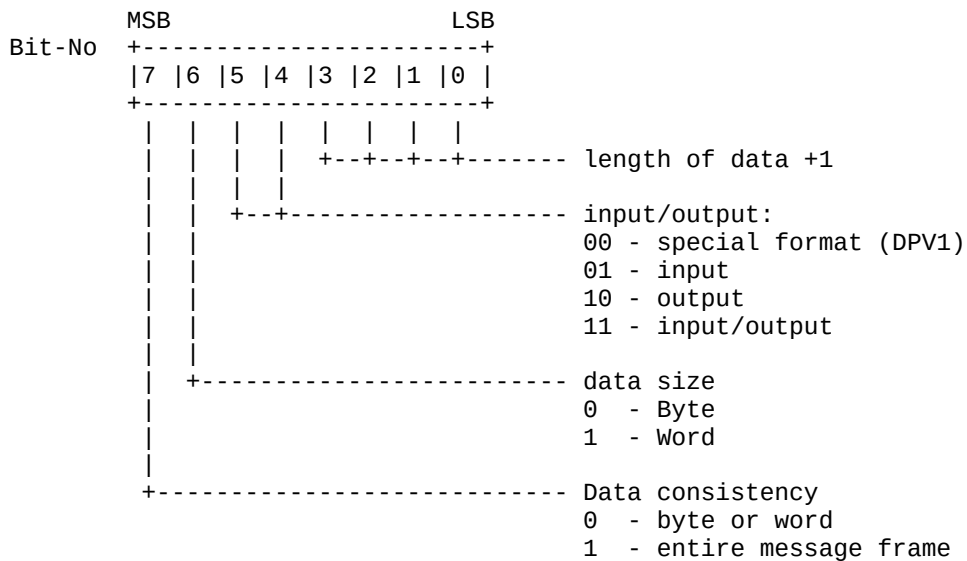
- There is a maximum of 16 (32 bytes) input words. The Module input word setting therefore may be no greater than 0x5F.
- There is a maximum of 4 (8 bytes) output words. The 4 output words are used only for demand data (data-exchange). The Module output word setting must remain 0x63.
- For example: Module = "TU" 0x5F, 0x63. TU/TC Series supports only 2 bytes are here.
- You cannot enter in the User_Prm_Data output addresses in the GSD file – either through the GSD file editor or using a text editor. Doing so will cause a configuration error.
- The function of the 4 output words is detailed in a subsequent section.

The parameterization from the standard Euro_tu.gsd is shown below.

```
; Parameterization:
```

```
User_Prm_Data_Len = 9
User_Prm_Data =
0x00,0x00,0x04,0x00,0x05,0x00,0x06,0x00,0x07
Max_Input_Len = 32
Max_Output_Len = 8
Max_Data_Len = 40
Module = "TU" 0x53,0x63
Endmodule
```

To decode the meaning of the Module byte values, a bit map has been included below.

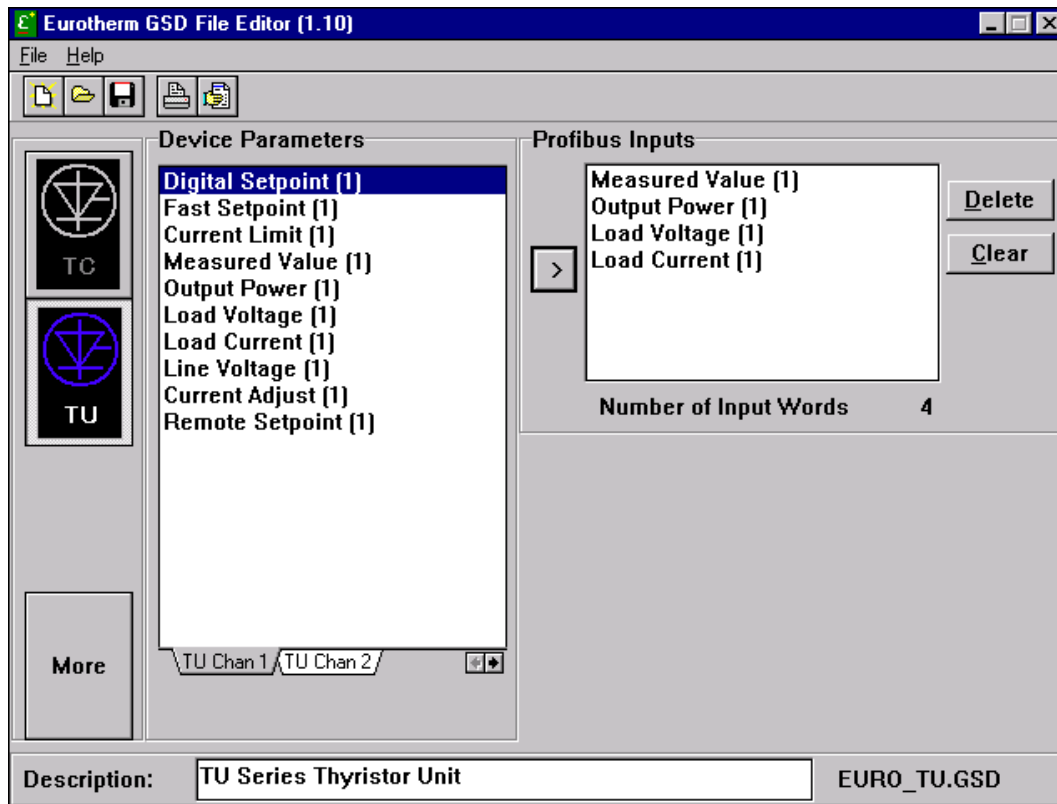


For example 0x53 (0101 0011) would specify; 1) word data size, 2) input, and 3) data length of 4.

Table 6. Standard Eurotherm GSD Files

File Name	Description
Euro_tc.gsd	Standard parameter mapping for TC Series – see Figure 7.
Euro_tu.gsd	Standard parameter mapping for TU Series.

Figure 7. Standard Euro_tc.gsd File Parameters



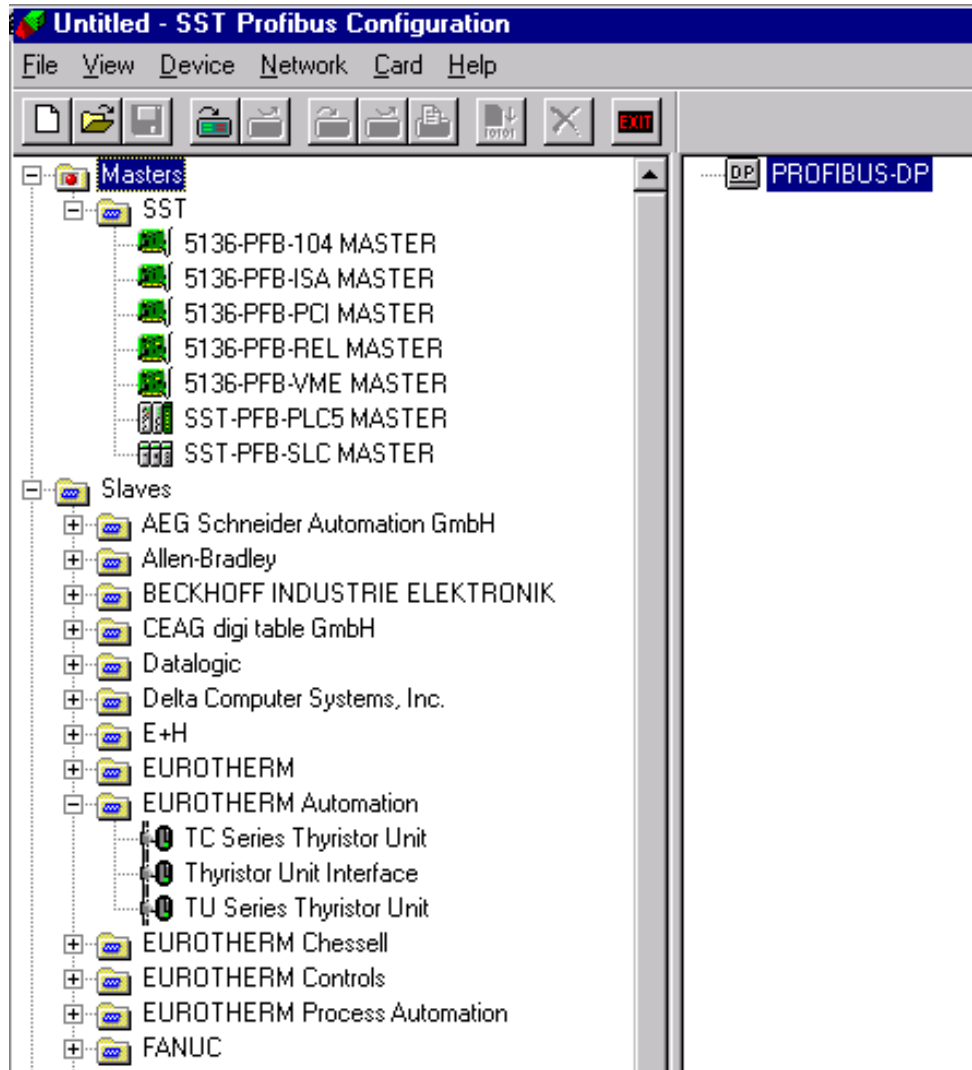
6) Import GSD file.

Start the SST Profibus Configuration software to automatically load the Eurotherm TU/TC Series GSD files to the Slaves list. The GSD files may not automatically load if they are not in the expected subdirectory or are invalid. If they do not automatically load they may be added by manually importing the GSD file. To add a GSD file, first select the Device menu title, then select the Add Device menu item. An Add Profibus devices dialog box appears. Make sure to *Look in*: the GSD subdirectory – or subdirectory where the GSD files are stored, and select the Euro_tc.gsd file or other TU/TC series GSD file of your choice.

If done correctly, the TU/TC Series GSD files under the Eurotherm Automation folder will now appear in the hierarchical tree view under the Slaves branch as shown in Figure 8. By selecting a TU/TC Series unit and right clicking, the Properties dialog is enabled allowing one to view the contents of the GSD file in a tabular dialog box. For example, under the Parameters tab are the hex values of the input words selected in the Eurotherm GSD file editor software tool.

The GSD files are ASCII files and may be opened using a text editor. However, it is not immediately obvious what all the data in the GSD file is for without a suitable reference guide.

Figure 8. Profibus Device Hierarchical Tree

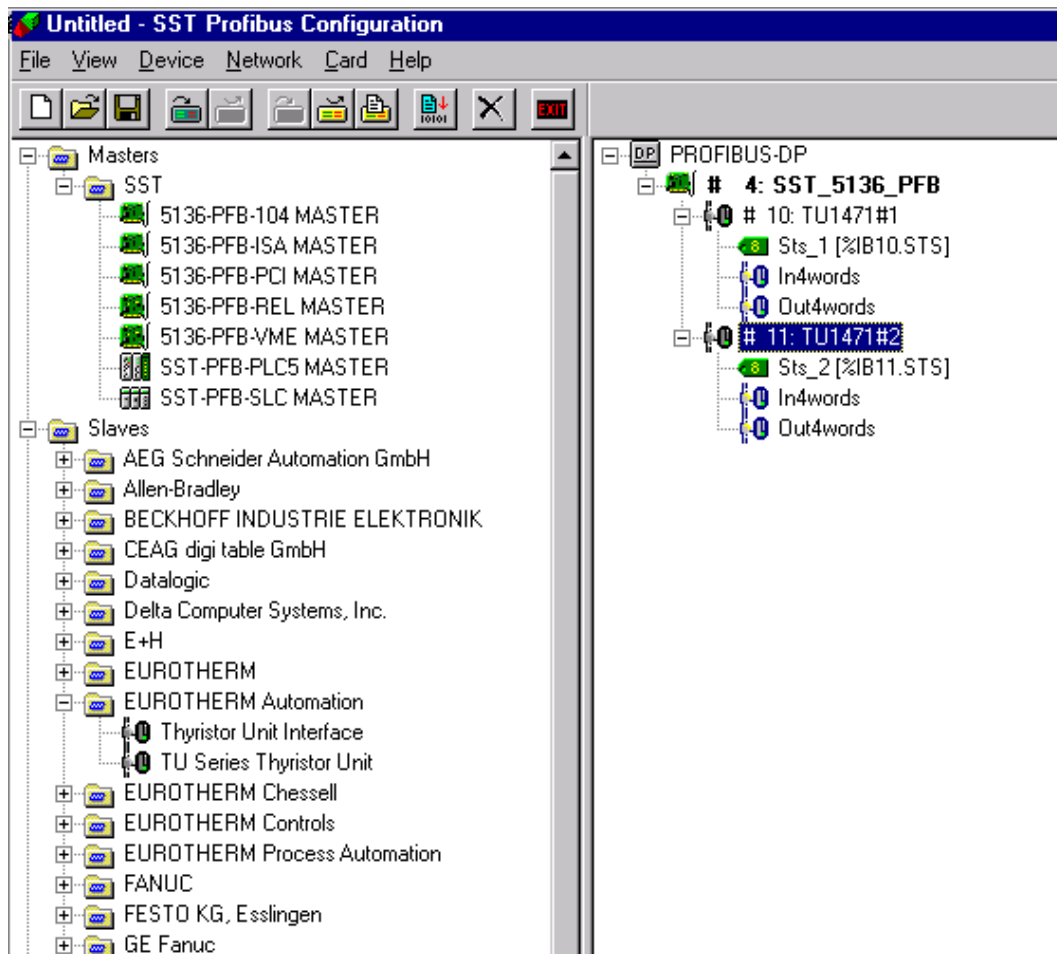


7) *Add a Profibus DP Master.*

The 5136-PFB-ISA interface card acts as a Profibus DP master to scan up to 96 slaves or devices. More than 32 slaves require a repeater to achieve the 96 slaves. The interface card supports up to 244 bytes of input data and 244 bytes of output data per slave. The interface card supports a total of 16Kbytes input data and 16Kbytes output data for all slave data. It is permissible to have multiple interface cards in the same host computer.

To add a Profibus DP Master from the hierarchical tree view expand the Masters and SST branch and drag the 5136-PFB-ISA MASTER object to the right hand pane. Do this by left clicking and holding the left mouse button down anywhere on the 5136-PFB-ISA MASTER row and dragging it across to the right-hand pane and release the mouse button. Doing so causes a Master device to be added to the Profibus-DP hierarchical tree and the SST 5136-PFB-ISA MASTER dialog box to appear where the name, card name, description, Master Station address, and the scan cycle time under the Parameters tab may be configured. Figure 9 shows the interface card renamed as 'SST_5136_PFB' and the Master Station address changed to 4. A master device must be added to the configuration before any slave devices can be added.

Figure 9. Profibus Master and 2 TU1471 Slaves Configured.



8) Add Eurotherm TU/TC Series(s) as Slaves.

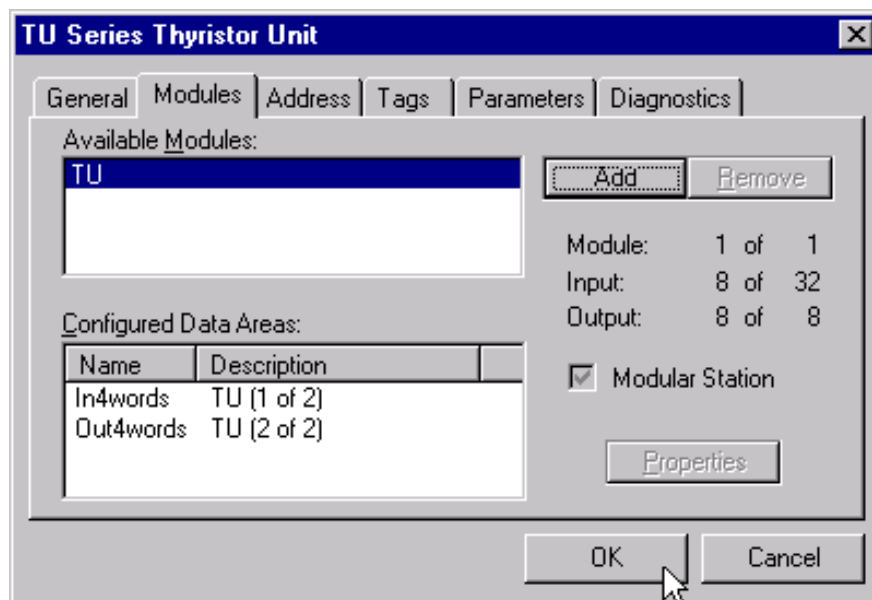
As with the Profibus master, drag a TU/TC Series object over to the right-hand pane. In our example a TU Series is added shown as 'TU Series Thyristor Unit' in Figure 8 in the left-hand pane. A TU Series Profibus-DP slave is added to the hierarchical tree and the TU Series Thyristor Unit properties dialog box shown in Figure 10 appears where the name, description, address, modules, parameters, and more may be configured.

The Module must be configured which is under the Modules tab. To configure the Module click on the Modules tab then click the 'Add' command button to add the TU Module under the Modules tab as shown in Figure 10. The single available Module is named TU in our example.

To add more TU's to the Profibus network simply drag the TU Series Thyristor Unit object over to the right-hand pane. Rename it if desired and make sure the slave address is correct – it auto-increments from the last lowest open address. Figure 9 shows 2 TU Series renamed to 'TU1471#1' and 'TU1471#2'. The slave station addresses are 10 and 11 respectively as shown by the number followed by a colon just before the name of the TU Series.

Right clicking on the slave device in the right-hand pane brings up the properties dialog box.

Figure 10. Properties Dialog Box



The GSD file imported in Step 6 defines one (TU/TC supports one module definition only) or more Module definitions for an automation device. These are shown in the Available Modules pane under the Modules tab and are required for the configuration of the slave device. The Module definition in the GSD file defines the Module name, length of the input and output data and the size of this data – as byte or word in length. This information is decoded and displayed in the Configured Data Areas under the Modules tab. Some automation devices have multiple Modules.

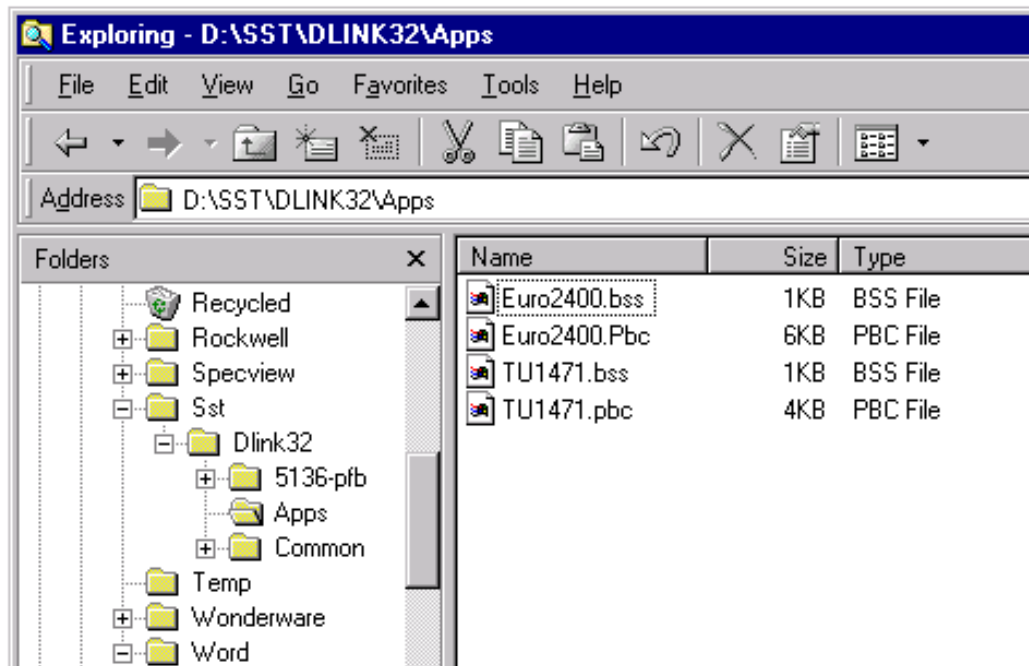
The Name column of the Configured Data Areas pane represents the type and the size of the Module by default. The Description column lists the original name defined in the GSD file for the selected Module. Some Modules consist of multiple data areas – input and output in our example.

On the right-hand side of the Modules tab, Module: means the number of modules that have been configured. In our example, 1 of 1 means the TU/TC Series supports 1 Module. The Input: is the size of the configured input data in bytes. The Output: is the size of the configured output data in bytes. If the Modular Station check box is checked modules may be added or removed from the slave device. In this case only one can be configured.

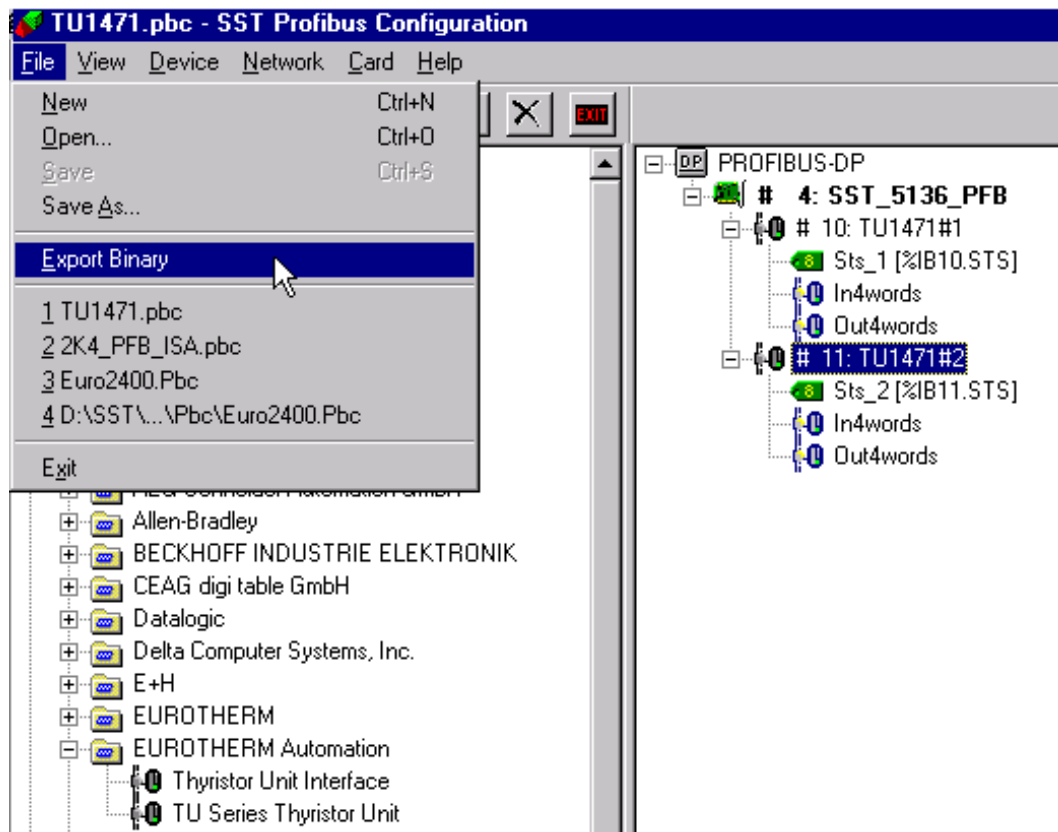
The Remove command button is used to remove a selected module from the configured modules list. The name in the Configured Data Areas data must first be selected by clicking on it if the Remove command button is not enabled.

9) *Save Configuration*

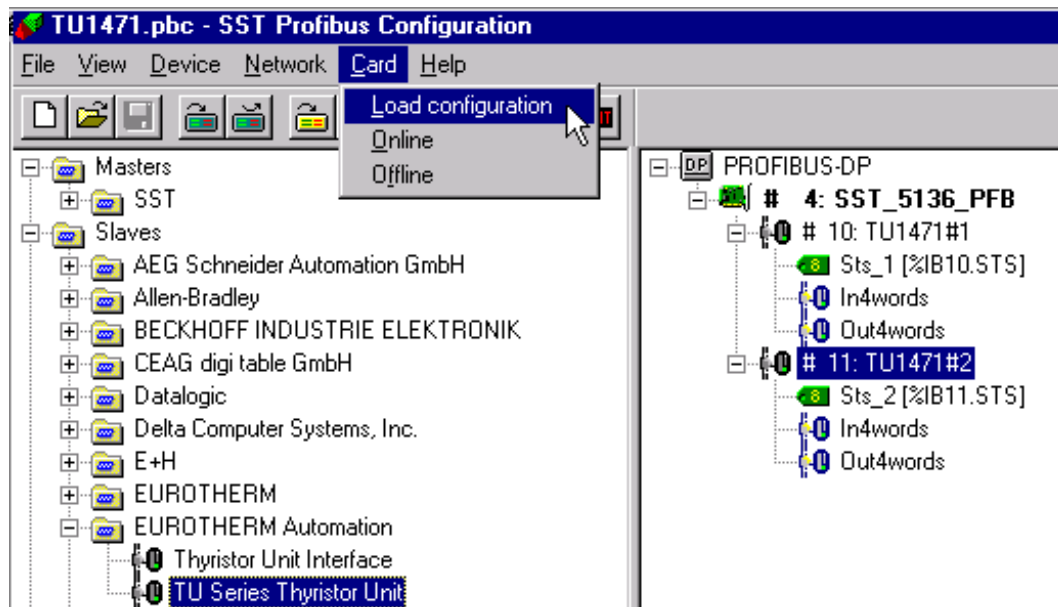
Under the File menu title, select the Save menu item, enter an appropriate file name – TU1471 was used for this example, in the Save dialog box and select Save. A subdirectory named Apps was created under the Dlink32 subdirectory to store application files in this example. See Figure 11.

Figure 11. Saved Configuration Files

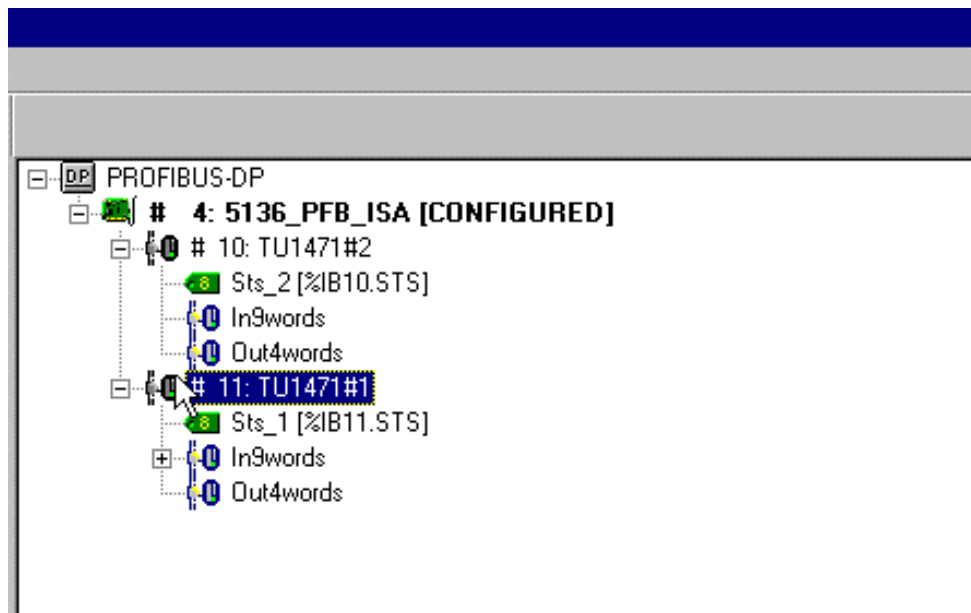
Note from Figure 11 the TU1471.bss file. This file is needed for the PFBDDDEM1 DDE server configuration. To generate, from the File menu title, select Export Binary as shown in Figure 12. The file name defaults to the current saved or loaded configuration.

Figure 12. Export Binary Configuration File**10) Download Configuration**

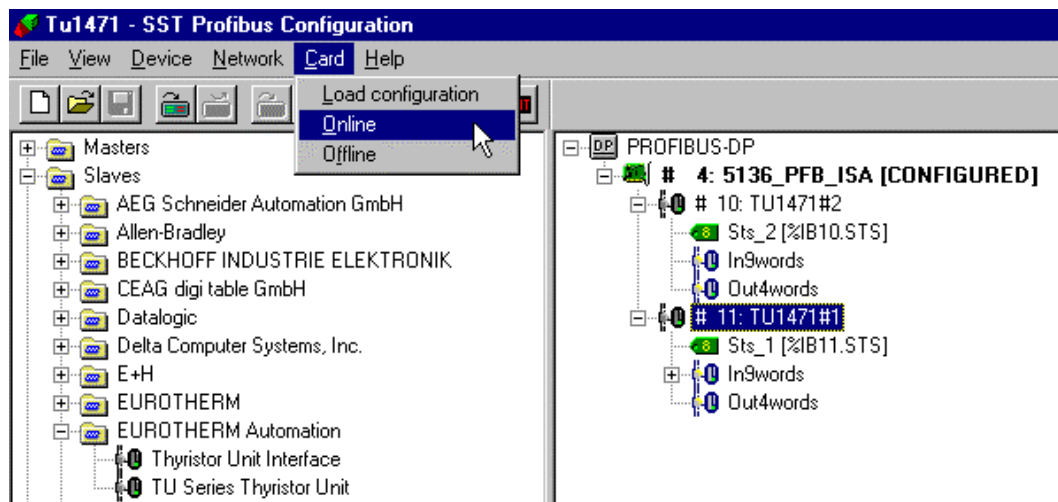
To download the configuration to the interface card, from the Card menu title, select Load Configuration as shown in Figure 13. The interface card must be Offline before downloading of the configuration. If not Offline, the interface card may be set Offline by selecting the Offline menu item from the Card menu title.

Figure 13. Load Configuration

The SST Profibus Configuration software will download the saved configuration to the interface card. If successful, the word CONFIGURED is displayed after the Master in parenthesis as shown in Figure 14.

Figure 14. Interface Card Configured**11) Set Interface Card Online**

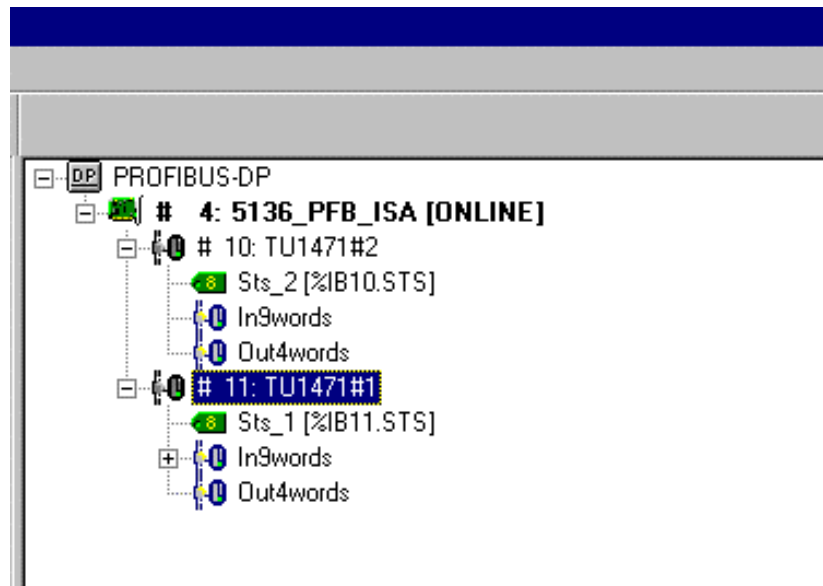
Again, from the Card menu title, to set interface card Online, select Online as shown in Figure 15.

Figure 15. Set Interface Card Online

If successful, the CONFIGURED is replaced by ONLINE in parenthesis as shown in Figure 16 and the interface starts scanning the network. At this time both the System Status and Comms Status LED's on the interface card should now be solid green in color. To check the operation of the Profibus network, the DP Monitor software under the Monitor Utilities folder may be used.

It is not always necessary to go ONLINE at this stage. In particular when using OPC, the Client side will cause an automatic connect to the interface card. If using DDE, normally the Client side prompts to start the DDE server if it is not already running.

Figure 16. Interface Card Online



At this point the SST Profibus Configuration software may be exited with the interface card left ONLINE. What happens now? How is visualization achieved? How do we get instrument data into and out of the host computer?

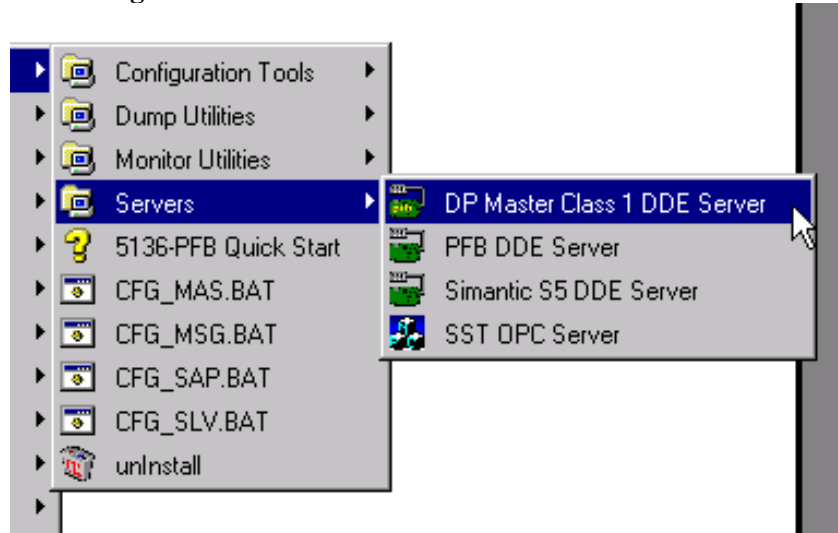
There are 3 ways for this to happen. There are available OPC and DDE servers, and proprietary drivers written for specific software packages. These 3 technologies provide interface to the majority of popular HMI and application software available in the marketplace. The next sections show the use of a DDE Server and Wonderware's InTouch.

Be sure to check the Eurotherm web site (eurotherm.com) for other application notes on the use of these servers with the Profibus network.

12) Configure DDE Server

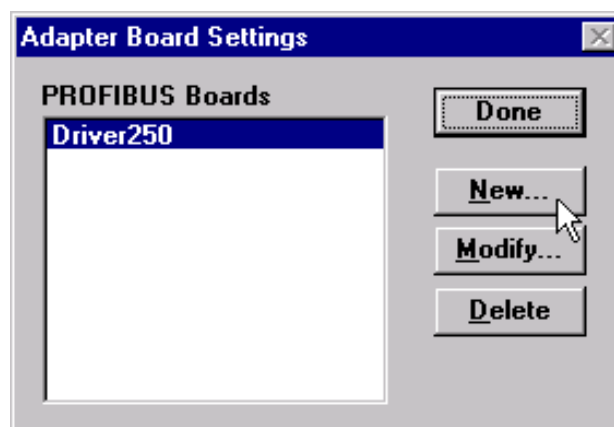
Included with the SST Profibus Configurator tools are a number of communications servers. In this example select from the Servers folder the DP Master Class 1 DDE Server as shown in Figure 17. The PFB DDE Server is used for Profibus slave applications.

Figure 17. Starting the PDBDDEM1 Server



The first step is to select Board Configuration... under the Configure menu title. The Adapter Board Settings dialog box appears. Select New to add an adapter board configuration as shown in Figure 18.

Figure 18. Adapter Board Settings



The settings for the adapter card may now be entered into the PFBDDDE Adapter Card Settings dialog box as shown in Figure 19. The Registered Boards entry must match the card name as shown in Figure 2.

Figure 19. PFBDDDE Adapter Card Settings



Select the correct baud rate – 12mb is typical, and enter the Station address that matches that of the address of the 5136_PFB_ISA card entered in step 7. Check the Master check box and uncheck the Slave check box. Then enter the full path and file name of the exported binary file from step 9. In this example the full path and file name is:

D:\SST\DLINK32\Apps\TU1471.bss

Make sure to include the file type 'bss'.

Next, select Topic Definition... under the Configure menu title. The PFBDDDE Topic Definition dialog box appears as shown in Figure 20. In the Names frame, the Topic: is a reference name that will be used in subsequent steps. Typically there is a Topic for each TU/TC Series on the Profibus node as the Topic defines the station address, the number of input and output words, and update rate. The Topic name therefore should be relevant to the function of the defined station address.

The Adapter Card: is again the name of the 5135_PFB_ISA card from step 1.

Figure 20. PFBDDDE Topic Definition

PFBDDDE Topic Definition

Names

Topic: Adapter Card:

Topic Configuration

Topic Type

☐ Diagnostic to Master
☐ Parameter from Master
☐ I/O Data
☐ Master Diagnostic
☒ Master I/O

Slot: Format:

I/O Type: Length:

Slave Station Number:

Update msec

In the Topic Configuration frame, the Topic Type Master I/O check box must be enabled. The I/O Type: set to I/Os, the Slave Station Number set to match the address of the slave TU/TC, the Format: set to WORD, and the Length: set to match the total length of the input and output registers from the configuration. The Update may be changed from the default of 1 second if either faster or slower update times from the DDE server are desired.

The DDE Server Settings... menu item under the Configure menu title typically does not require any modification. Be sure to visit the last menu item under the Configure menu title, Save Configuration. The default file name is Pfbddem1.cfg.

The SSConfig menu item under the Direct Link Registry menu title typically does not require any changes. Figure 21 shows the results of pressing the Properties command button for the Driver250 card. Again, this information should match that configured in step 1 and not require any changes.

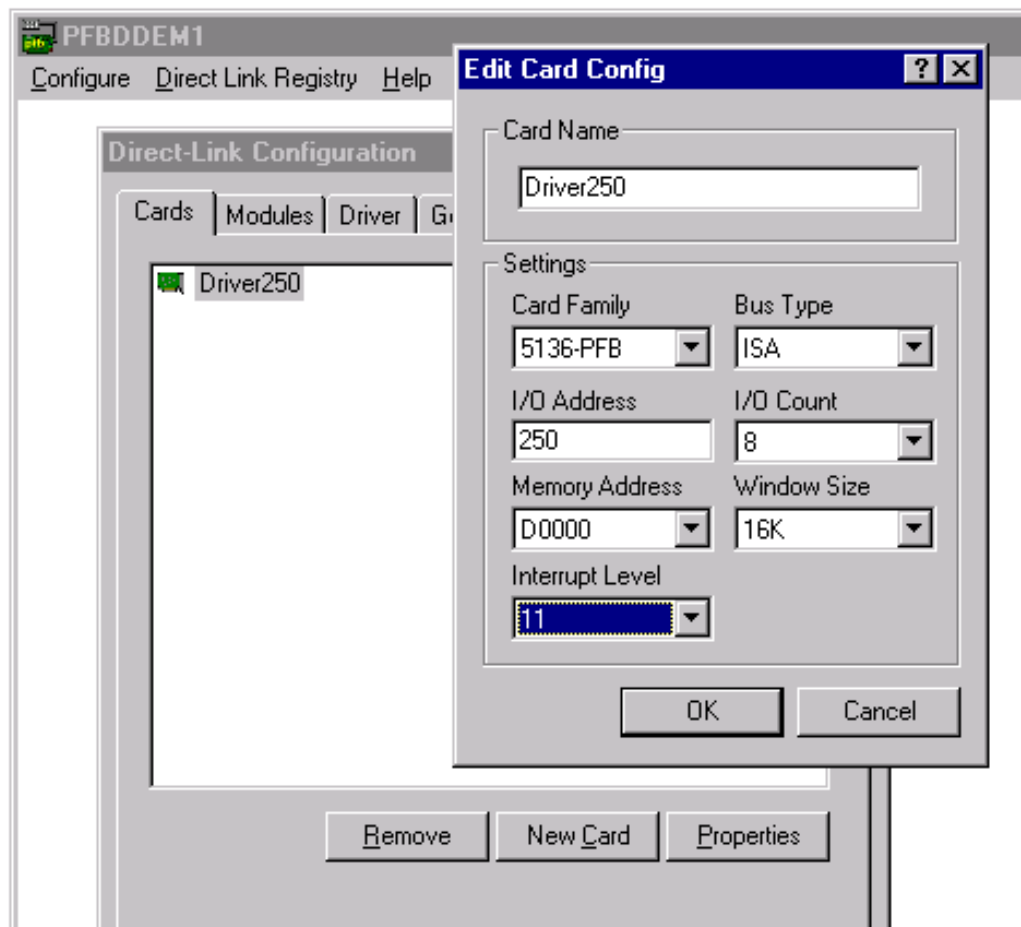
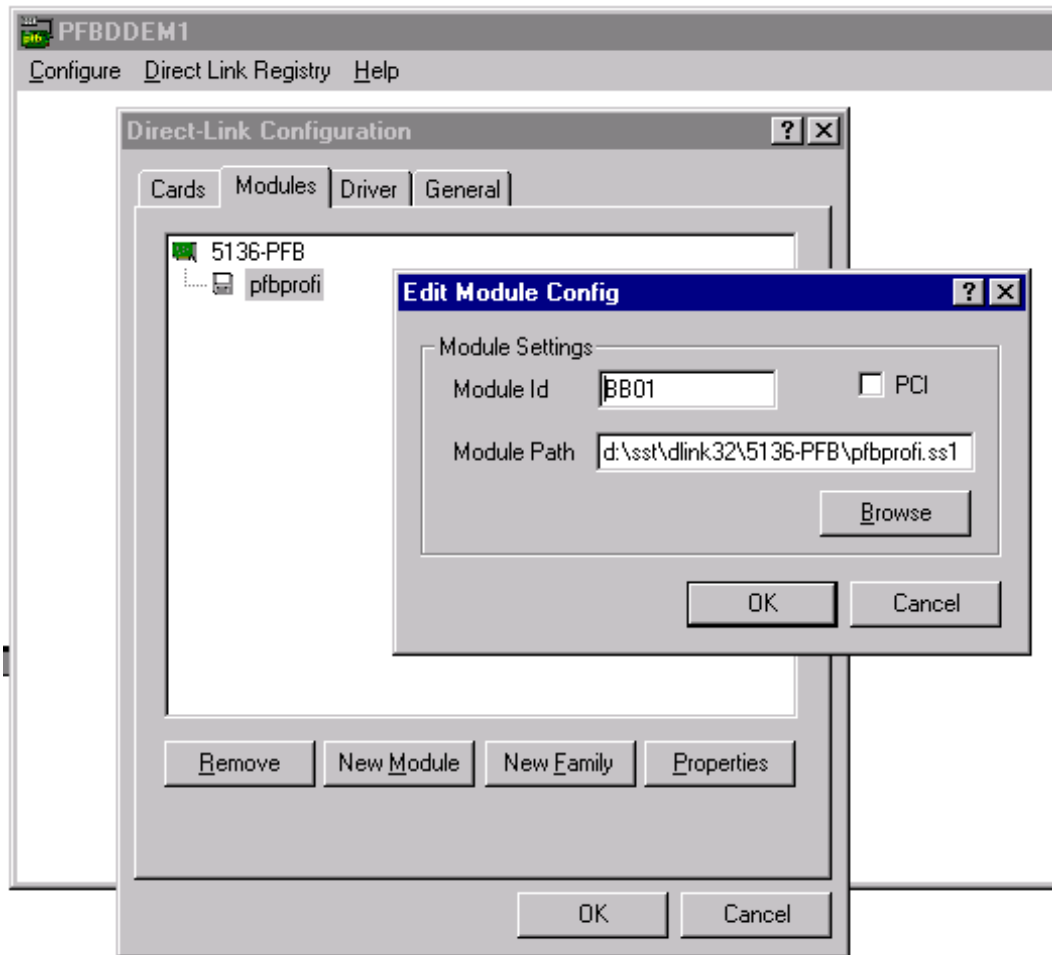
Figure 21. PFBDE Direct-Link Card Configuration

Figure 22 shows the Direct-Link Modules configuration. For each 5136_PFB_ISA card in the PC, a module file named pciprofi.ss1 or pfbprofi.ss1 is required. In this example, the PC has 1 ISA card so the pciprofi file has been deleted. The Module ID for the 5136_PFB_ISA card is BB01 as shown in Figure 22 – do not change.

The settings under Driver and General tabs do not require any changes unless it is resired to manually start the PFBDE server rather than automatically. This setting is under the Driver tab.

Figure 22. PFBDE Direct-Link Module Configuration

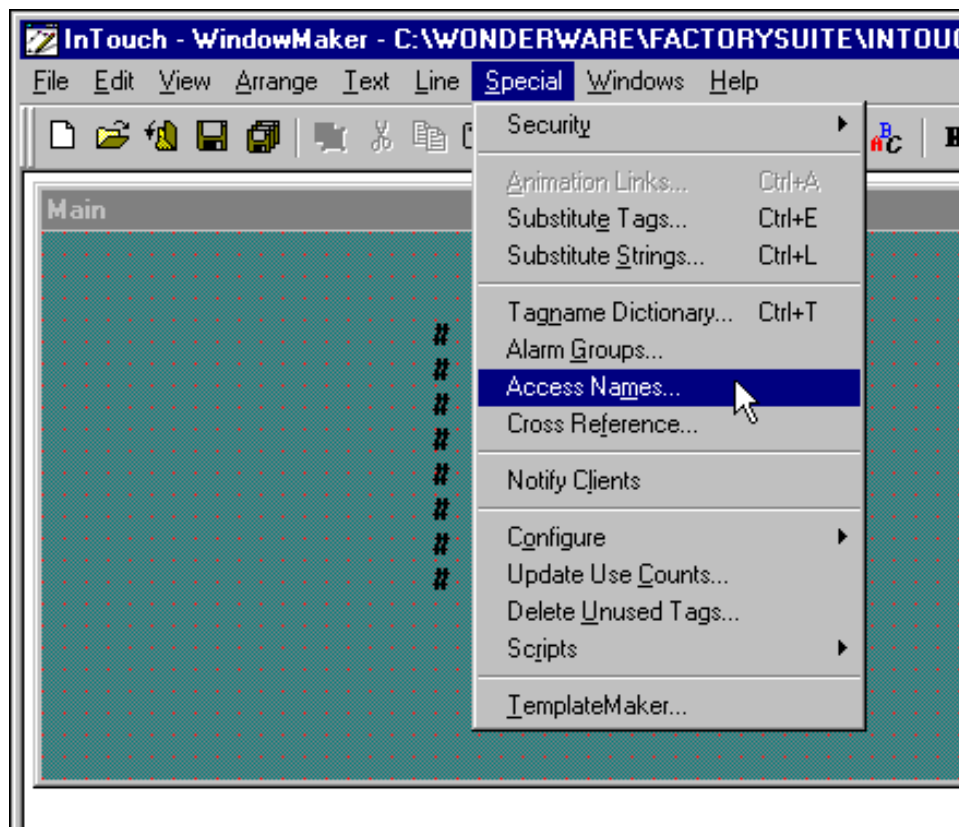
This completes the settings for the PFBDE server.

13) Configuring InTouch Tags

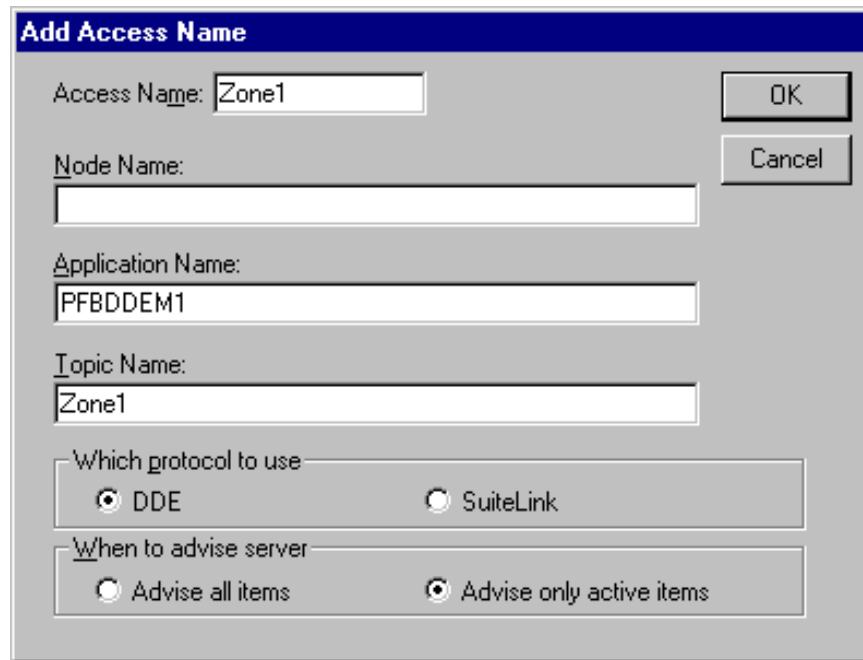
This section does not go into detail on configuring and creating a display(s) in InTouch. It is assumed that the expertise necessary for that is available. Rather, this section covers the basics in the configuration of the Access names and the creation of input and output tags.

After creating a new application, Access names are necessary to be able to reference the Topic names in created step 12. Figure 23 shows how to access the Access Names... menu item. There is an Access Name for each Topic used.

Figure 23. Access Names... Menu Item



From the Access Names dialog box select the Add... command button to create a new Access Name. The Add Access Names dialog box appears as shown in Figure 24. Enter into the Access Name: text box a name used to reference the Application and Topic that are entered in next. Typically the access name is the same as the topic name though it does not need to be. The Application Name: is PFBDDDEM1. Enter into the Topic Name: text box the name of a topic created from step 12.

Figure 24. Add Access Names Dialog Box

The dialog box is titled "Add Access Name" in a blue header bar. It contains several input fields and two groups of radio buttons. The "Access Name" field is filled with "Zone1". The "Node Name" field is empty. The "Application Name" field is filled with "PFBDDDEM1". The "Topic Name" field is filled with "Zone1". The "Which protocol to use" group has two radio buttons: "DDE" (selected) and "SuiteLink". The "When to advise server" group has two radio buttons: "Advise all items" and "Advise only active items" (selected). There are "OK" and "Cancel" buttons in the top right corner.

Field	Value
Access Name:	Zone1
Node Name:	
Application Name:	PFBDDDEM1
Topic Name:	Zone1
Which protocol to use	☒ DDE ☐ SuiteLink
When to advise server	☐ Advise all items ☒ Advise only active items

To create tags for read and write purposes select the Tagname Dictionary... under the Special menu title as shown in Figure 25.

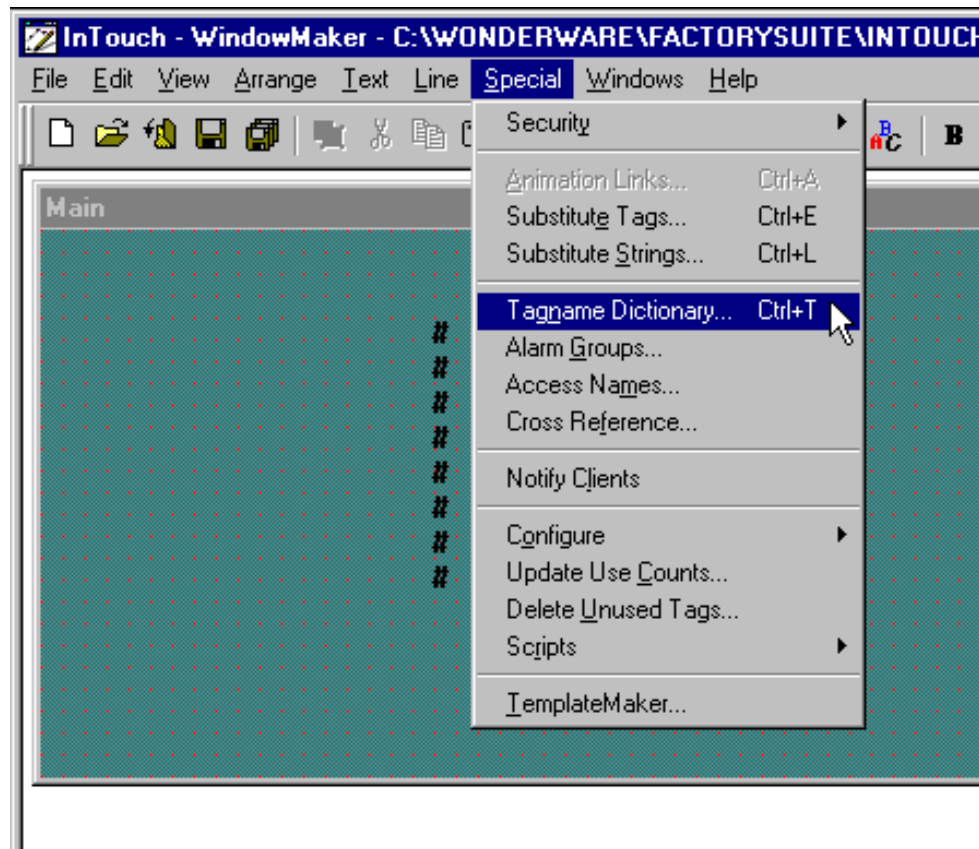
Figure 25. Tagname Dictionary Menu Item

Figure 26 shows the tagname definition dialog box. Important fields of note are:

Type: ... which should be set to either I/O Real or I/O Integer. Some parameters in the Series 2000 have implicit decimal point positions or IEEE 4 byte single precision modbus addresses that necessitate the need for I/O Real data types.

Access Name: ... click on the Access Name command button to select the Access Name associated with the Topic and therefore the station address of the TU/TC for which the Item is being configured.

Item: ... to address a register in the 5136_PFB_ISA card, a pre-defined format must be used for each item.

An item format includes: item type, register within configured topic, then optional bit number and display format. The first letter represents the item type. The item names are not case sensitive, so capital letters could also have been used.

q	means the item is type of an output from Master
i	means the item is type of an input to Master
d	means the item is type of diagnostic to Master
p	means the item is type of parameter from Master

The register is the number within configured length of the parent topic and follows item type. As the length was defined as a Word in the Topic definition, one separates each item register. This is shown in Table 7.

The next part of the item name is the optional bit offset separated with a forward slash ("/"). Value of the bit can be (0-7) when topic data configured as BYTE and (0-15) when topic data configured as a WORD.

The last part of the item name is the optional display format. These qualifiers must be separated from the register by a space.

S or SIGNED treats the value as a signed 8-bit for BYTE FORMAT number (-128 to 127) or 16-bit for WORD FORMAT number (-32768 to 32767)

4 or 4BCD the value is treated as a 4-digit BCD number (0 to 9999)

3 or 3BCD the value is treated as a 3-digit BCD number (0 to 999)

For integer format of the item no bit number is to be defined nor slash ("/") character present.

Figure 26. Tagname Definition

Tagname Dictionary

☐ Main
 ☒ Details
 ☐ Alarms
 ☐ Details & Alarms
 ☐ Members

Tagname:
 Type: I/O Real

Group:
☒ Read only
 ☐ Read Write

Comment:

☐ Log Data
 ☐ Log Events
 ☐ Retentive Value
 ☐ Retentive Parameters

Initial Value:
 Min EU:
 Max EU:

Deadband:
 Min Raw:
 Max Raw:

Eng Units:

Access Name:

Conversion:

☒ Linear

☐ Square Root

Item:

☐ Use Tagname as Item Name

 Log Deadband:

For our example Table 7 shows the Tag names and Item names for the 4 input and 4 output registers.

Table 7. Example Item Definition

Tagname:	Item:	Description
RZ1MV	i0	Read Zone 1 Measured Value
RZ1OP	i1	Read Zone 1 Output Power
RZ1LV	i2	Read Zone 1 Load Voltage
RZ1LC	i3	Read Zone 1 Load Current
WZ1CMD	o0	Write Zone 1 Command/Parameter Address
WZ1RS1	o1	Write Zone 1 Reserved 1
WZ1RS2	o2	Write Zone 1 Reserved 2
WZ1VAL	o3	Write Zone 1 Value

14) Using Demand Data in the TU/TC Series

The 4 output words defined in the GSD file do not have TU/TC parameter addresses associated with them. These output words are instead reserved for demand data or data-exchange purposes – a request/response scenario. This allows parameters to be read which are not defined in the GSD file or any writeable parameter to be written.

In other words, by entering a command, a parameter address and optionally a parameter value for a write command, a request to read or write any addressable parameter in the TU/TC Series may be made. Table 8 details the 4-word output structure.

Table 8. Demand Data Structure

Word							
0		1		2		3	
Byte (or Octet)							
0	1	2	3	4	5	6	7
Command & Parameter Address		Reserved				Value	

The command word (bytes 0 and 1) is further broken down as shown in Table 9. The valid commands are shown in Table 10.

Table 9. Word 0 Command/Parameter Address

Byte															
0								1							
Bit															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Command				Reserved				Parameter Address							

Whenever the command becomes a non-zero value indicating demand data, the input or read words defined in the GSD file are replaced by the response to the demand data request. The mapping of the read registers duplicates that of the 4 output words though the meaning of the command is different. For example, if an invalid request is made the hex value 70 would be returned in the first byte of the input words.

For those configurations where more than 4 input words are defined the values of all input words greater than 4 is 0.

Table 10. Valid Demand Data Commands

Command	Request (Outputs)	Reply (Inputs)
0	No Command	N/A
1	Read Request	Ack Read
2	Write Request	Ack Write
7	N/A	Reject Request

In the case of a request error, the command field in the first byte (0th byte) of the input word contains the value 7 while the value field in the 6th byte contains the error code value. Error codes are shown in the Table 11 below.

Table 11. Demand Data Error Codes

Error Code	Description
0	Invalid Parameter Number
1	RO Parameter (Write Request)
2	Data >0x7FFF
3	WO Parameter (Read Request)
4	Not 8 Bytes in the Configuration
5	Command not Valid for this Unit

By way of 4 examples below are shown how to read and write using demand data. All values are shown in hex. Again, note that the input registers are used for the reply.

1) Read Process Value (PV) of TU channel 1 – address 04 (0x04). Here 03 E8 corresponds to a PV of 100.0)

Request			
WZ1CMD	WZ1RS1	WZ1RS2	WZ1VAL
10 04	00 00	00 00	00 00

Reply			
RZ1MV	RZ1OP	RZ1LV	RZ1LC
10 04	00 00	00 00	03 E8

2) Read Power Demand (OP) of TU channel 3 – address 35 (0x23). Here 00 F5 corresponds to an OP of 24.5

Request			
WZ1CMD	WZ1RS1	WZ1RS2	WZ1VAL
10 23	00 00	00 00	00 00

Reply			
RZ1MV	RZ1OP	RZ1LV	RZ1LC
10 23	00 00	00 00	00 F5

3) Write Local Setpoint (SL) of TU channel 1 – address 1 (0x01). Here 01 F4 corresponds to a SL of 50.0.

Request			
WZ1CMD	WZ1RS1	WZ1RS2	WZ1VAL
20 01	00 00	00 00	01 F4

Reply			
RZ1MV	RZ1OP	RZ1LV	RZ1LC
20 01	00 00	00 00	01 F4

4) Write Current Limit Setpoint (CL) of TU channel 4 – address 33 (0x21). Here 02 EE corresponds to a CL of 75.0.

Request			
WZ1CMD	WZ1RS1	WZ1RS2	WZ1VAL
20 21	00 00	00 00	02 EE

Reply			
RZ1MV	RZ1OP	RZ1LV	RZ1LC
20 21	00 00	00 00	02 EE

The parameter addresses may be found in the following manuals:

TU Series: Digital communications for TU range thyristor units; Communications manual; Part No. HA173688, Issue 2 or greater

TC Series: Three phase power thyristor unit with digital communications; User Manual; Part No. HA173941, Issue 2 or greater

15) Problems**No Communications:**

- Check the wiring carefully, paying particular attention to the continuity of the A and B connections to the interface card. Ensure that the correct terminals have been wired to.
- Ensure that a Profibus Communication board is installed. The Model number should include the CCC and PFB option. It can be identified by the PROFIBUS legend on the CPU on the Communication board and the Profibus interface daughter-board that plugs into the Communication board.
- Check that the Node Address set by the jumpers on the TU/TC Series Communication board is correct for the interface card configuration in use.
- Ensure that the interface card is correctly configured and the configuration has been downloaded correctly to the Profibus master.
- Verify the GSD file in use is correct by loading it into the SST Profibus Configuration tool again. This will check the format. Verify that no output word addresses have been defined in the GSD file.
- Verify that the maximum line length for the baud rate in use is not exceeded (see table 4).
- Ensure that the last device (not necessarily a TU/TC Series) in the network segment is correctly terminated (see wiring diagram).
- Ensure that no devices other than those at the end of a segment have termination networks fitted.
- If possible, replace faulty device with a duplicate and retest.

Notes: